PATENT APPLICATION TRANSMITTAL LETTER

PTO/SB/05 (11-90)

Docket Number (Optional)

04/10/98 JC447 U.S. PTO

To the Commissioner of Patents and Trademarks:

Transmitted herewith for filing is the patent application of FREDERIC M. NEWMAN

entitled REMOTELY ACCESSIBLE MOBILE REPAIR UNIT FOR WELLS

Enclosed are:

- [X] 10 sheets of drawings.
- [ ] an assignment of the invention to
- [X] executed declaration of the inventors.
- [ ] a certified copy of a application.
- [X] associate power of attorney.
- [X] a verified statement to establish small entity status under 37 CFR 1.9 and 1.27.
- [X] information disclosure statement
- [ ] preliminary amendment
- [ ] other:

CLAIMS AS FILED

	NUMBER FILED	NUMBER EXTRA	RATE	FEE
BASIC FEE				
TOTAL CLAIMS	12 - 20 =	*		395
INDEPENDENT CLAIMS	5 - 3 =	* 2	X	
MULTIPLE DEPENDENT CLAIM PRESENT			X 41	82
* NUMBER EXTRA MUST BE ZERO OR LARGER				
			TOTAL	$ 477
If applicant has small entity status under 37 CFR 1.9 and 1.27, then divide total fee by 2, and enter amount here.			SMALL ENTITY TOTAL	$ 477

- [X] A check in the amount of $ 477 to cover the filing fee is enclosed.
- [ ] The Commissioner is hereby authorized to charge and credit Deposit Account No. as described below. I have enclosed a duplicate copy of this sheet.
  - [ ] Charge the amount of $ as filing fee.
  - [ ] Credit any overpayment.
  - [ ] Charge any additional filing fees required under 37 CFR 1.16 and 1.17.
  - [ ] Charge the issue fee set in 37 CFR 1.18 at the mailing of the Notice of Allowance, pursuant to 37 CFR 1.311(b).

4/10/98
Date

Robert J. Hatcher
Signature

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

(For use with Form PTO/SB/06)

Application Number:

Filing Date: 4/9/98

Applicant(s): FREDERIC M. NEWMAN

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT	
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PATENT

Title

REMOTELY ACCESSIBLE MOBILE REPAIR UNIT FOR WELLS

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REMOTELY ACCESSIBLE MOBILE REPAIR UNIT FOR WELLS

Background Of The Invention

Field Of The Invention

The subject invention generally pertains to equipment used for repairing wells that have already been drilled, and more specifically pertains to mobile repair units that frequently travel from one site to another.

Description Of Related Art

After an oil rig drills a well and installs the well casing, the rig is dismantled and removed from the site. From that point on, a mobile repair unit is typically used to service the well. Servicing includes installing and removing inner tubing strings, sucker rods, and pumps. The variety of work requires a myriad of tools. When the tooling is not closely associated with the mobile repair unit, the right equipment may not be available when needed.

Moreover, the work is carried out by a company that typically owns and operates several mobile repair units. The units are often operating at the same time at various remote sites. Some sites may be separated by hundreds of miles. This makes it difficult to stay abreast of the status at each of the sites.

Typically, a supervisor will travel from site to site. However, this is inefficient and often critical steps of an operation get carried out unsupervised. At times, accidents occur in the absence of an unbiased witness.

Summary Of The Invention

To avoid the problems of today's mobile repair units, a first object of the invention is to closely associate hydraulic and pneumatic systems with a mobile repair unit by having them share a common power supply and monitoring system.

A second object of the invention is to provide a remotely accessible mobile repair unit with the necessary equipment to make it universally adaptable to do a variety of work such as removing and installing an inner tubing string, sucker rods, and pumps.

A third object is to provide a mobile repair unit that senses and transmits, to a remote home base, data that identifies the extent to which an inner tubing string was stretched prior to flooding the well bore with fluid.

A fourth object is to identify from a remote location key events, such as the time of transition of installing steel sucker rods to installing fiberglass ones.

A fifth object is to restrict local operator access to a system that monitors the operation of a mobile repair unit so an unbiased and unaltered record can be recorded and maintained of the complete system and activity of the mobile repair unit.

A sixth object is to convey to a remote location a record that helps explain events that led to an accident at the work site. When the information is conveyed to a remote site, it is not likely to be destroyed by the accident itself, such as a fire.

A seventh object is to remotely identify an imbalance of a mobile repair unit caused by wind or leaning inner tubing segments against its derrick.

An eighth object is to remotely distinguish between the raising and lowering of an inner tubing string to help establish the cause of an accident. An added benefit is to be able to place the proper predetermined tension on a packer or tubing anchor being set.

A ninth object is to enable one to remotely identify when a mobile repair unit is operating for the purpose of determining the amounts to be invoiced for the work performed.

A tenth object is to provide a method of alerting a home base of a hazardous level of hydrogen sulfide gas present at a remote work site.

These and other objects of the invention are provided by a self-contained mobile repair unit having a universal set of hydraulic and pneumatic tooling for servicing well equipment such as an inner pipe string, a sucker rod and a pump. The repair unit and tooling share a common engine. An extendible derrick supporting a hoist is pivotally coupled to the frame of the repair unit. A monitor senses the load on the derrick and conveys that information to a remote home base where the time of critical events is identified.

Brief Description Of The Drawings

Figure 1 is a side view of a mobile repair unit with its derrick extended.

Figure 2 is a schematic view of a pneumatic slip in a locked position.

Figure 3 is a schematic view of a pneumatic slip in an open position.

Figure 4 is a schematic illustration of a set of hydraulic tongs.

Figure 5 is a side view of a mobile repair unit with its derrick retracted.

Figure 6 is an electrical schematic of a monitor circuit.

Figure 7 is an end view of an imbalanced derrick.

Figure 8 shows digital data associated with a time stamp.

Figure 9 illustrates the raising and lowering of an inner tubing string.

Figure 10 shows an inner tubing being lowered.

Figure 11 shows an inner tubing stopped at a predetermined depth.

Figure 12 shows an inner tubing being locked in a conventional manner to another casing.

Figure 13 shows an inner tubing being stretched.

Figure 14 shows pre-stretched inner tubing locked within an outer casing.

Figure 15 shows a first steel sucker rod (with a pump) being lowered into an inner tubing string.

Figure 16 shows a second steel sucker rod being lowered into an inner tubing string.

Figure 17 shows a first fiberglass sucker rod being lowered into an inner tubing string.

Figure 18 shows a second fiberglass sucker rod being lowered into an inner tubing string.

Description Of The Preferred Embodiment

Referring to Figure 1, a retractable, self-contained mobile repair unit 20 is shown to include a truck frame 22 supported on wheels 24, an engine 26, a hydraulic pump 28, an air compressor 30, a first transmission 32, a second transmission 34, a variable speed hoist 36, a block 38, an extendible derrick 40, a first hydraulic cylinder 42, a second hydraulic cylinder 44, a first transducer 46, a monitor 48, and retractable feet 50.

Engine 32 selectively couples to wheels 24 and hoist 36 by way of transmissions 34 and 32, respectively. Engine 26 also drives hydraulic pump 28 via line 29 and air compressor 30 via line 31. Compressor 30 powers a pneumatic slip 84 (Figures 2 and 3), and pump 28 powers a set of hydraulic tongs 52 (Figure 4). Pump 28 also powers cylinders 42 and 44 which respectively extend and pivot derrick 40 to selectively place derrick 40 in a working position (Figure 1) and in a lowered position (Figure 5). In the working position, derrick 40 is pointed upward, but its longitudinal centerline 54 is angularly offset from vertical as indicated by angle 56. The angular offset provides block 38 access to a well bore 58 without interference with derrick pivot point 60. With angular offset 56, the derrick framework does not interfere with the typically rapid installation and removal of numerous inner pipe segments 62 and sucker rods 64 (Figure 16).

Individual pipe segments 62 and sucker rods 64 are screwed to themselves using hydraulic tongs 66 which are schematically illustrated in Figure 4. The term "hydraulic

tongs" used herein and below refer to any hydraulic tool that can screw together two pipes or sucker rods. An example would include those provided by B. J. Hughes company of Houston, Texas. In operation, pump 28 drives a hydraulic motor 68 forward and reverse by way of valve 70. Conceptually, motor 68 drives pinions 72 which turn wrench element 74 relative to clamp 76. Element 74 and clamp 76 engage flats 81 on mating couplings 78 of a sucker rod or inner pipe string of one conceived embodiment of the invention. However, it is well within the scope of the invention to have rotational jaws or grippers that clamp on to a round pipe (i.e., no flats) similar in concept to a conventional pipe wrench, but with hydraulic clamping. The rotational direction of motor 68 determines assembly or disassembly of couplings 78. Transducer 80 is used to provide a 0-5 VDC signal 82 that in one embodiment of the invention indicates the applied torque to couplings 78.

Referring to Figures 2 and 3, when installing inner pipe segments 62, pneumatic slip 84 is used to hold a string of pipe 62 while the next segment 62' is screwed on using tongs 66. Compressor 30 provides pressurized air through valve 86 to rapidly clamp and release slip 84 (Figures 2 and 3, respectively). A tank 88 helps maintain a constant air pressure. Pressure switch 90 provides monitor 48 with a signal that indirectly indicates that repair unit 20 is in operation.

Referring back to Figure 1, weight applied to block 38 is sensed by way of a hydraulic pad 92 that supports the weight of derrick 40. Hydraulic pad 92 is basically a piston within a cylinder (alternatively a diaphragm) such as those provided M. D. Totco company of

Cedar Park, Texas. Hydraulic pressure in pad 92 increases with increasing weight on block 38. In Figure 6, first transducer 46 converts the hydraulic pressure to a 0-5 VDC signal 94 that is conveyed to monitor 48. Monitor 48 converts signal 94 to a digital value, stores it in a memory 96, associates it with a real time stamp, and eventually communicates the data to a remote home base 100 by way of a modem 98.

In the embodiment of Figure 7, two pads 92 associated with two transducers 46 and 102 are used. An integrator 104 separates pads 92 hydraulically. The rod side of pistons 106 and 108 each have a pressure exposed area that is half the full face area of piston 108. Thus chamber 110 develops a pressure that is an average of the pressures in pads 92. One type of integrator 104 is provided by M. D. Totco company of Cedar Park, Texas. In one embodiment of the invention, just one transducer 46 is used and it is connected to port 112. In another embodiment of the invention, two transducers 46 and 102 are used, with transducer 102 on the right side of unit 20 coupled to port 114 and transducer 46 on the left side coupled to port 116. Such an arrangement allows one to identify an imbalance between the two pads 92.

Returning to Figure 6, transducers 46 and 102 are shown coupled monitor 48. Transducer 46 indicates the pressure on left pad 92 and transducer 102 indicates the pressure on the right pad 92. A generator 118 driven by engine 26 provides an output voltage proportional to the engine speed. This output voltage is applied across a dual-resistor voltage divider to provide a 0-5 VDC signal at point 120 and then passes through an amplifier 122.

Generator 118 represents just one of many various tachometers that provide a feedback signal proportional to the engine speed. Another possibility would be to have engine 26 drive an alternator and measure its frequency. Transducer 80 provides a signal proportional to the pressure of hydraulic pump 28, and thus proportional to the torque of tongs 66.

A telephone accessible circuit 124, referred to as a "POCKET LOGGER" by Pace Scientific, Inc. of Charlotte, North Carolina, includes four input channels 126, 128, 130 and 132; a memory 96 and a clock 134. Circuit 124 periodically samples inputs 126, 128, 130 and 132 at a user selectable sampling rate; digitizes the readings; stores the digitized values; and stores the time of day that the inputs were sampled. It should be appreciated by those skilled in the art that with the appropriate circuit, any number of inputs can be sampled. Page Scientific provides circuits that employ multiplexing to provide twelve input channels.

An operator at a home base 100 remote from the work site at which repair unit 20 is operating accesses the data stored in circuit 124 by way of a PC-based modem 98 and a cellular phone 136. Phone 136 reads the data stored in circuit 124 via lines 138 (RJ11 telephone industry standard) and transmits the data to modem 98 by way of antennas 140 and 142. In one embodiment of the invention, phone 136 includes a CELLULAR CONNECTION™ provided by Motorola Incorporated of Schaumburg, Illinois (a model S1936C for Series II cellular transceivers and a model S1688E for older cellular transceivers).

Some details worth noting about monitor 48 is that its access by way of a modem makes monitor 48 relatively

inaccessible to the crew at the job site itself. Amplifiers 122, 144, 146 and 148 condition their input signals to provide corresponding inputs 126, 128, 130 and 132 having an appropriate power and amplitude range. Sufficient power is needed for RC circuits 150 which briefly (e.g., 2-10 seconds) sustain the amplitude of inputs 126, 128, 130 and 132 even after the outputs from transducers 46, 102 and 80 and the output of generator 118 drop off. This ensures the capturing of brief spikes without having to sample and store an excessive amount of data. A DC power supply 152 provides a clean and precise excitation voltage to transducers 46, 102 and 80; and also supplies circuit 124 with an appropriate voltage by way of voltage divider 154. Pressure switch 90 enables power supply 152 by way of relay 156 whose contacts 158 close by coil 160 being energized by battery 162.

Figure 8 shows an example of the data extracted from circuit 124 and remotely displayed at PC 164. The values plotted at a point in time indicated by numeral 166 represent repair unit 20 at rest with engine 26 idling as shown in Figure 1. Numeral 168 showing weight on block 38 and high engine speed indicates the raising of an inner pipe string 62 as represented by arrow 170 of Figure 9. Numeral 172 showing weight on block 38 and low engine speed indicates the lowering of inner pipe string 62 as represented by arrow 174 of Figure 9. Points 176, 178, 180, 182 and 184 correspond to the conditions illustrated in Figures 10, 11, 12, 13 and 14, respectively. In Figure 10, an inner tubing string 62 is being lowered into an outer casing 186. In Figure 11, tubing string is stopped at a predetermined depth. In Figure 12 tubing string 62 is

rotated in a conventional manner to lock its lower end 188 to outer casing 186 (note slight torque at point 190). In Figure 13 an upper end 192 of string 62 is raised until the pressure parameter at right and left pads 92 reach the predetermined limit indicated by numeral 194. In Figure 14 wedge 196 locks upper end 192 to casing 186, and block 38 is disconnected from tubing string 62. Points 198, 200, 202 and 204 correspond to the conditions illustrated in Figures 15, 16, 17 and 18, respectively, which depict the lowering of a string of sucker rods having a pump 77 at its lower end. Intermediate points 199, 201 and 203 indicate tongs 66 screwing onto the first steel sucker rod 64 a second steel sucker rods 206, a fiberglass sucker rod 208, and a second fiberglass sucker rod 210, respectively. Note the difference in torque and the incremental weight difference at pads 92 when changing over from steel rods to fiberglass ones. Points 212 correspond to the windy conditions illustrated by arrow 214 of Figure 7. The absence of data points beyond 12:00 indicates that the windy conditions prevented the crew from continuing, or it was Friday afternoon.

Referring back to Figure 4, it should be noted that transducer 80 represents any one of a variety of devices that produce an electrical signal in response to a change in a sensed condition. In one embodiment of the invention, transducer 80 is actually a hydrogen sulfide gas detector with signal 82 serving as a gas detection signal that varies with a varying concentration of hydrogen sulfide gas 250. An example of a hydrogen sulfide gas detector is a CONTROLLER 8000 provided by Industrial Scientific Corporation of Oakdale, Pennsylvania.

Although the invention is described with respect to a preferred embodiment, modifications thereto will be apparent to those skilled in the art. Therefore, the scope of the invention is to be determined by reference to the claims which follow.

I claim:

C L A I M S

1. A retractable and self-contained mobile repair unit for repairing wells at a plurality of various job sites, said mobile repair unit having a universal capability of servicing an inner pipe string, a sucker rod, and a pump, said mobile repair unit comprising:

a truck frame supported on a plurality of wheels;

an engine coupled to said truck frame and adapted to relocate said truck frame to said various job sites;

a hydraulic pump coupled to said engine;

an air compressor coupled to said engine;

a first transmission coupled between said engine and said plurality of wheels;

a second transmission coupled to said engine;

a variable speed hoist coupled to said second transmission;

an extendible derrick pivotally coupled to said truck frame, said derrick being selectively repositionable to a lowered position and a working position, said derrick being retracted in said lowered position and extended in said working position, said derrick being pointed upward but having a longitudinal centerline that is angularly offset from vertical in said working position;

a block suspended by said hoist at a position that is angularly offset to said centerline of said derrick when said derrick is in said working position, said block being selectively coupled to said inner pipe string, said sucker rod, and said pump, said block in conjunction with

said hoist being adapted to raise and lower said inner pipe string, said sucker rod, and said pump in a substantially vertical direction;

a first hydraulic cylinder coupled to said derrick and said hydraulic pump, said first hydraulic cylinder adapted to extend and retract said derrick;

a second hydraulic cylinder coupled to said derrick and said hydraulic pump, said second hydraulic cylinder adapted to pivot said derrick;

a hydraulic tongs coupled to said hydraulic pump and adapted to apply a torque to said inner pipe string and said sucker rod, thereby facilitating installation and removal of said inner pipe string and said sucker rod;

a pneumatic slip coupled to said air compressor and adapted to selectively grip and release said inner pipe string to facilitate installation of said inner pipe string;

a first transducer providing a first signal that varies as a function of weight applied to said block;

a clock providing a time reference;

a memory electrically coupled to said first transducer, said memory storing a first plurality of digital values representative of said first signal, said first plurality of digital values being associated with said time reference; and

a modem electrically coupled to said memory, said modem linking said memory to a remote home base to establish a communication link between said remote home base and said plurality of various job sites at which said retractable and self-contained mobile repair unit is working.

2. The retractable and self-contained mobile repair unit as recited in claim 1, further comprising a second transducer spaced apart from said first transducer, said second transducer providing a second signal that varies as a function of weight applied to said block, said first signal deviating from said second signal upon a horizontal cross load being applied to said derrick, whereby a deviation between said first signal and said second signal indicates an imbalance of said derrick, said memory being electrically coupled to said second transducer, said memory storing a second plurality of digital values representative of said second signal, said second plurality of digital values being associated with said time reference.

3. The retractable and self-contained mobile repair unit as recited in claim 1, further comprising two spaced apart hydraulic pads supporting said extendible derrick, said two spaced apart hydraulic pads being coupled together by way of an integrator that develops an intermediate pressure that is between a minimum pressure and a maximum pressure at said two spaced apart hydraulic pads, said first transducer being in fluid communication with said intermediate pressure.

4. The retractable and self-contained mobile repair unit as recited in claim 1, further comprising a third transducer in fluid communication with said hydraulic tongs, said third transducer providing a third signal that varies as a function of said torque, said memory being electrically coupled to said third transducer, said memory storing a third plurality of digital values representative of said third signal, said third plurality of digital values being associated with said time reference.

5. The retractable and self-contained mobile repair unit as recited in claim 1, further comprising a tachometer providing a fourth signal that varies as a function of a speed at which said engine runs, said memory being electrically coupled to said tachometer, said memory storing a fourth plurality of digital values representative of said fourth signal, said fourth plurality of digital values being associated with said time reference.

6. The retractable and self-contained mobile repair unit as recited in claim 1, further comprising a hydrogen sulfide gas detector, said hydrogen sulfide gas detector providing a gas detection signal that varies with a varying concentration of a hydrogen sulfide gas, said memory being electrically coupled to said hydrogen sulfide gas detector, said memory storing a fifth plurality of digital values representative of said gas detection signal, said fifth plurality of digital values being associated with said time reference.

7. A method of remotely distinguishing the raising and lowering of a tubing segment of an inner pipe string, said method comprising the steps of:

applying a load to a hoist system by suspending said tubing segment therefrom, said hoist system including a derrick having a longitudinal centerline;

tilting said derrick to place said longitudinal centerline at an angle relative to vertical;

by way of said hoist system, selectively raising and lowering said tubing segment along a substantially vertical path;

monitoring a first parameter that changes upon said hoist system changing from raising to lowering of said tubing segment;

monitoring a second parameter that varies as a function of said load;

storing a first digital value representing said first parameter;

storing a second digital value representing said second parameter;

communicating said first digital value and said second digital value to a remote location by way of a modem; and

comparing, at said remote location, said first digital value to said second digital value, whereby said first digital value indicates raising and lowering, while said second digital value indicates said tubing segment is coupled to said hoist system.

8. The method of claim 7, wherein said hoist system includes an engine that powers said hoist system, and said first parameter varying as a function of a rotational speed of said engine.

9. A method of remotely determining an existence of a cross-load applied to a derrick of a mobile repair unit for a well, examples of said cross-load including but not limited to wind and leaning removed tubing against said derrick, said method comprising the steps of:

monitoring a first parameter that varies with a first force exerted by said mobile repair unit at a first point, said first force varying as a function of said cross-load;

monitoring a second parameter that varies with a second force exerted by said oil well repair unit at a second point spaced apart from said first point, said second force varying as a function of said cross-load;

storing a first digital value representing said first parameter;

storing a second digital value representing said second parameter;

communicating said first digital value and said second digital value to a remote location by way of a modem; and

comparing, at said remote location, said first digital value with said second digital value to determine a difference therebetween, said difference being an indication that said cross-load exists.

10. A method of later determining from a remote location that an inner tubing string of an oil well was properly stretched to compensate for a subsequent buoyancy effect that alters a distribution of tension along a length of said inner tubing, said method comprising the steps of:

by way of a hoist, lowering said inner tubing string into an outer casing of said oil well;

applying a load to said hoist upon lowering and raising said inner tubing string;

monitoring a parameter that varies as function of said load;

storing a first digital value representing said parameter as said inner tubing string is being lowered into said outer casing;

locking a lower end of said inner tubing string to said outer casing upon lowering said inner tubing to a predetermined depth;

by way of said hoist, raising an upper end of said inner tubing string until said parameter reaches a first predetermined limit, thereby stretching said inner tubing string;

storing a second digital value representing said parameter as said parameter reaches said first predetermined limit;

locking said upper end of said inner tubing string to said outer casing upon said parameter reaching said first predetermined limit; and

communicating said first digital value and said second digital value to said remote location by way of a modem, thereby providing a record that may be referred to after said subsequent buoyancy effect occurs.

11. A method of remotely identifying a time of transition from installing a plurality of steel sucker rods to that of installing a plurality of polymer sucker rods with a steel sucker rod weighing more than a polymer suck rod, said method comprising the steps of:

applying a load to a hoist upon lowering said plurality of steel sucker rods and said plurality of polymer sucker rods into an inner tubing of a well;

monitoring a parameter that varies as a function of said load;

sequentially and cumulatively lowering said plurality of steel sucker rods into said inner tubing;

storing a first plurality of digital values corresponding in number to said plurality of steel sucker rods, said first plurality of digital values representing

said parameter as said plurality of steel sucker rods are being lowered into said inner tubing;

coupling said polymer sucker rod to said plurality of steel sucker rods;

sequentially and cumulatively lowering said plurality of polymer sucker rods into said inner tubing;

storing a second plurality of digital values corresponding in number to said plurality of polymer sucker rods, said second plurality of digital values representing said parameter as said plurality of polymer sucker rods are being lowered into said inner tubing;

communicating said first plurality of digital values and said second plurality of digital values to a remote location by way of a modem; and

observing at said remote location a difference between said first plurality of digital values and said second plurality of digital values which identifies when said plurality of polymer suck rods were being lowered into said inner tubing.

12. The method as recited in claim 11 wherein said polymer sucker rods consists of a fiberglass.

Abstract Of The Disclosure

A self-contained mobile repair unit for repairing wells includes the hydraulic and pneumatic tooling required to do a variety of jobs including the installation and removal of an inner pipe string, sucker rods and a pump. The repair unit, hydraulic tooling and pneumatic tooling share a common engine and a common process monitor. Access to data gathered by the monitor is restricted at the job site itself. Instead, the data is transmitted to a remote home base for the purpose of monitoring operations form a central location.

FIG. 1

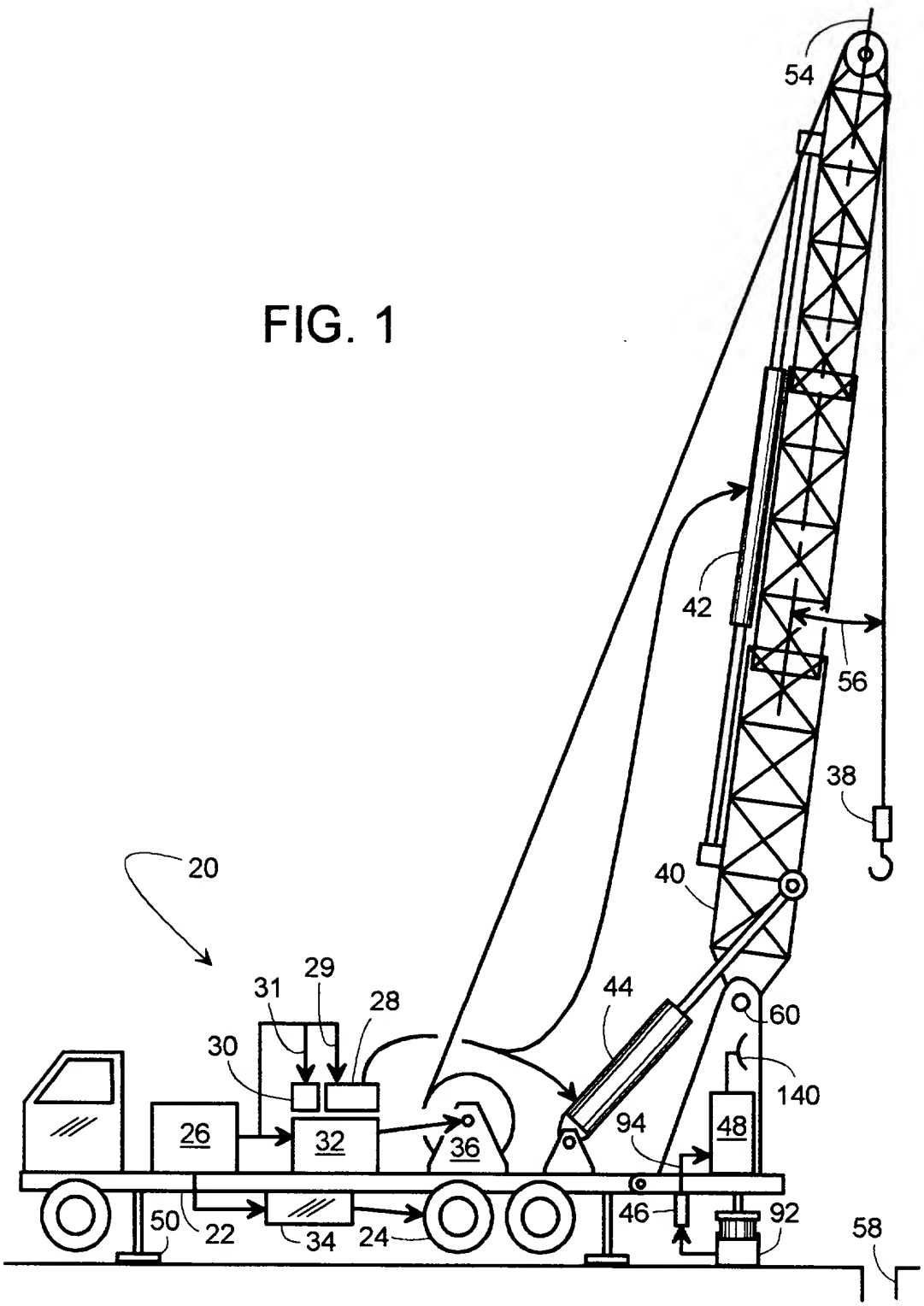
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FIG. 2

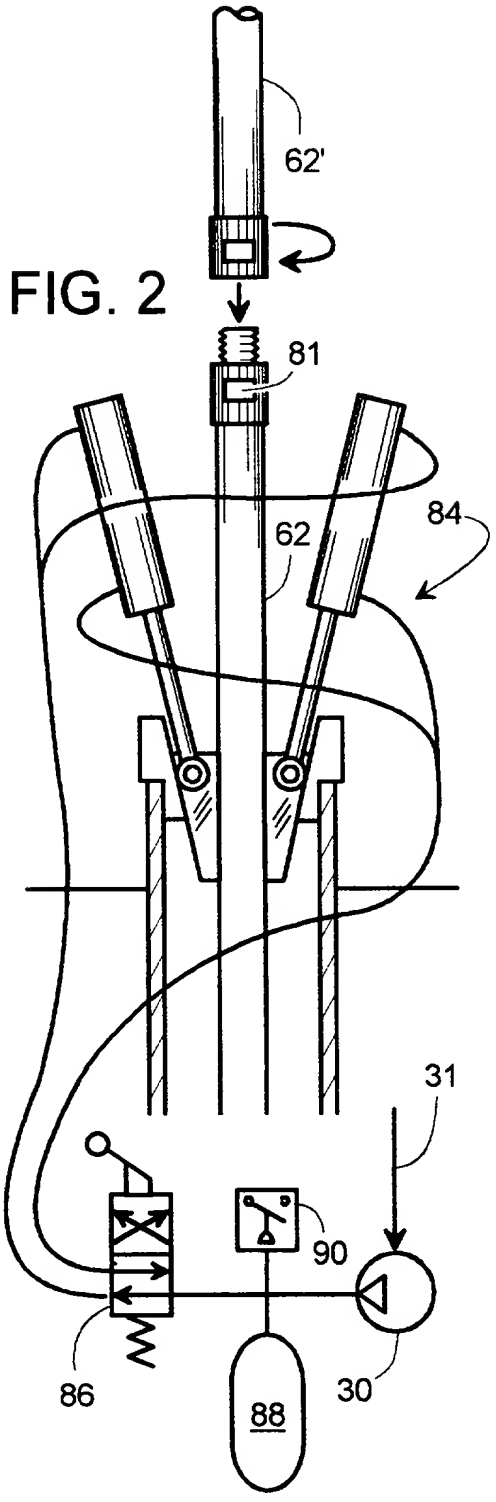


FIG. 3

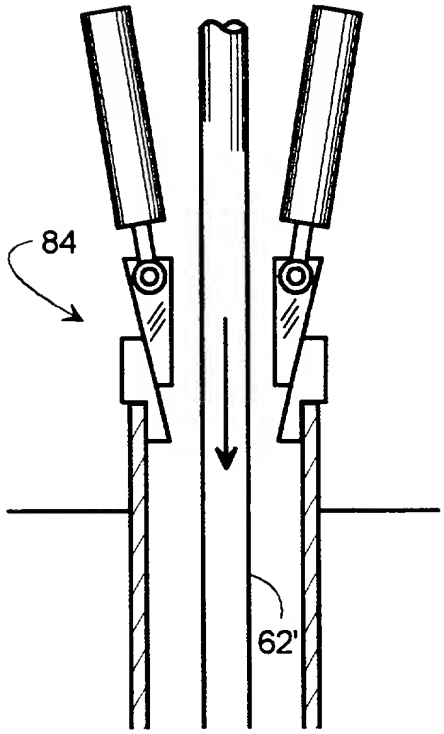


FIG. 4

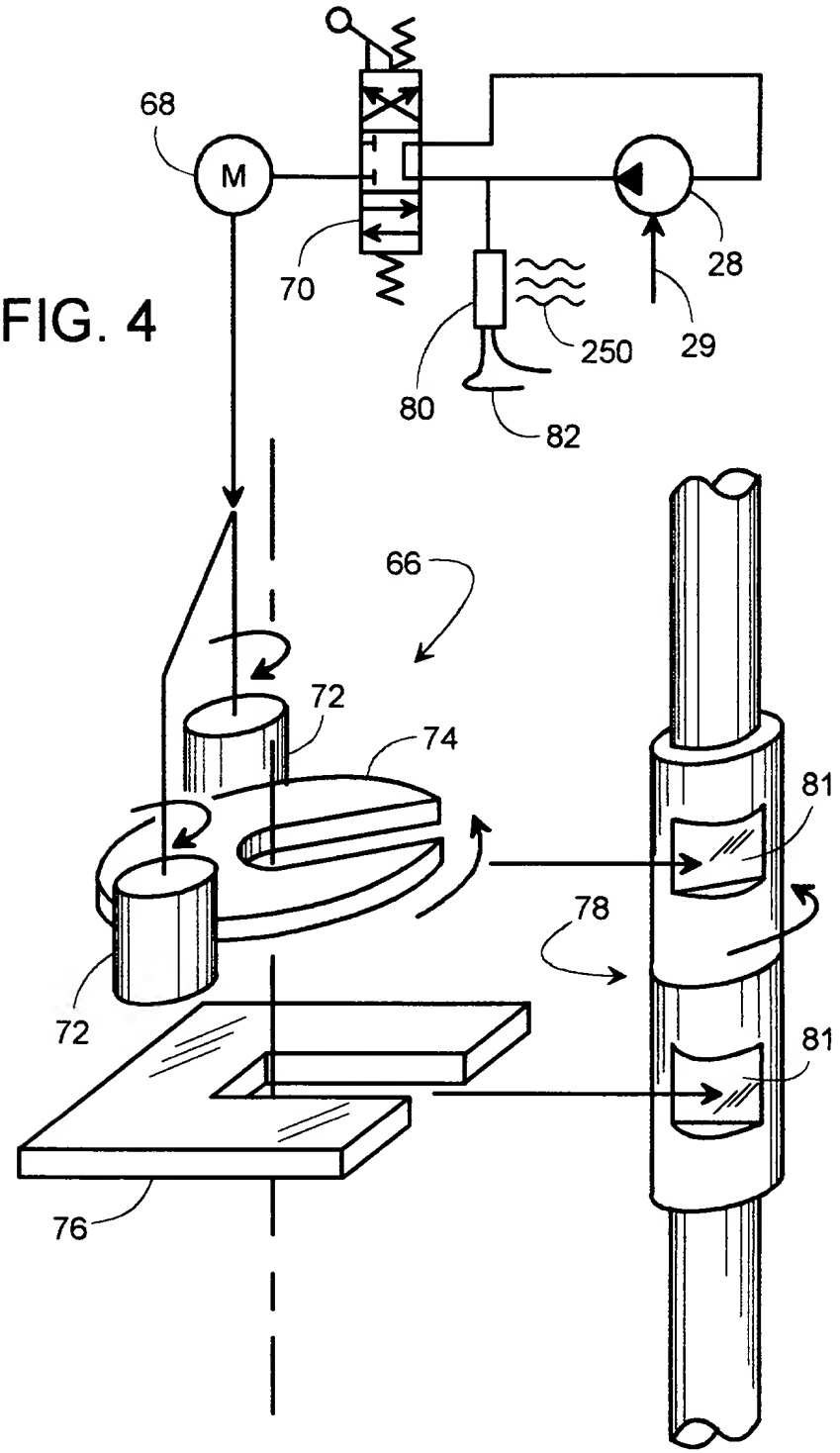
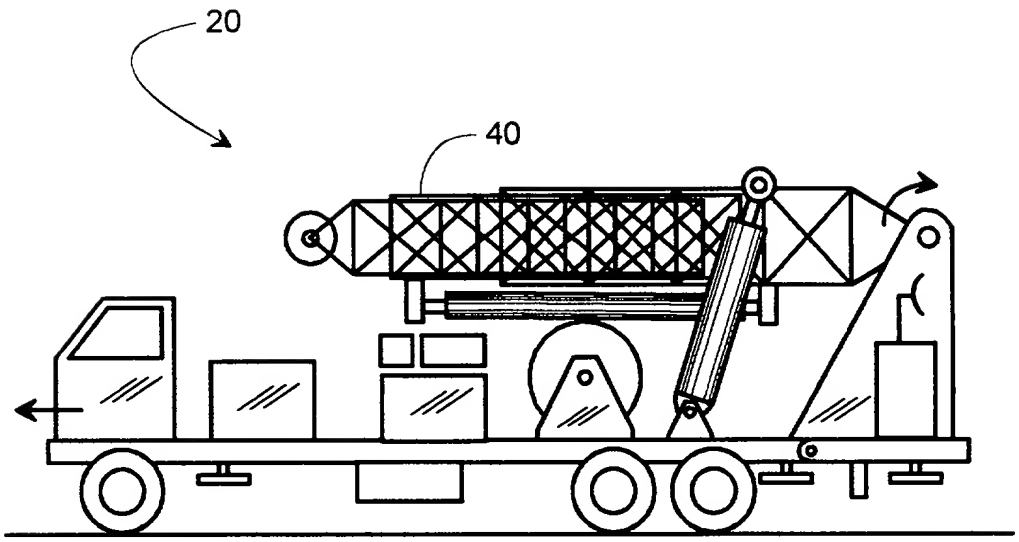


FIG. 5



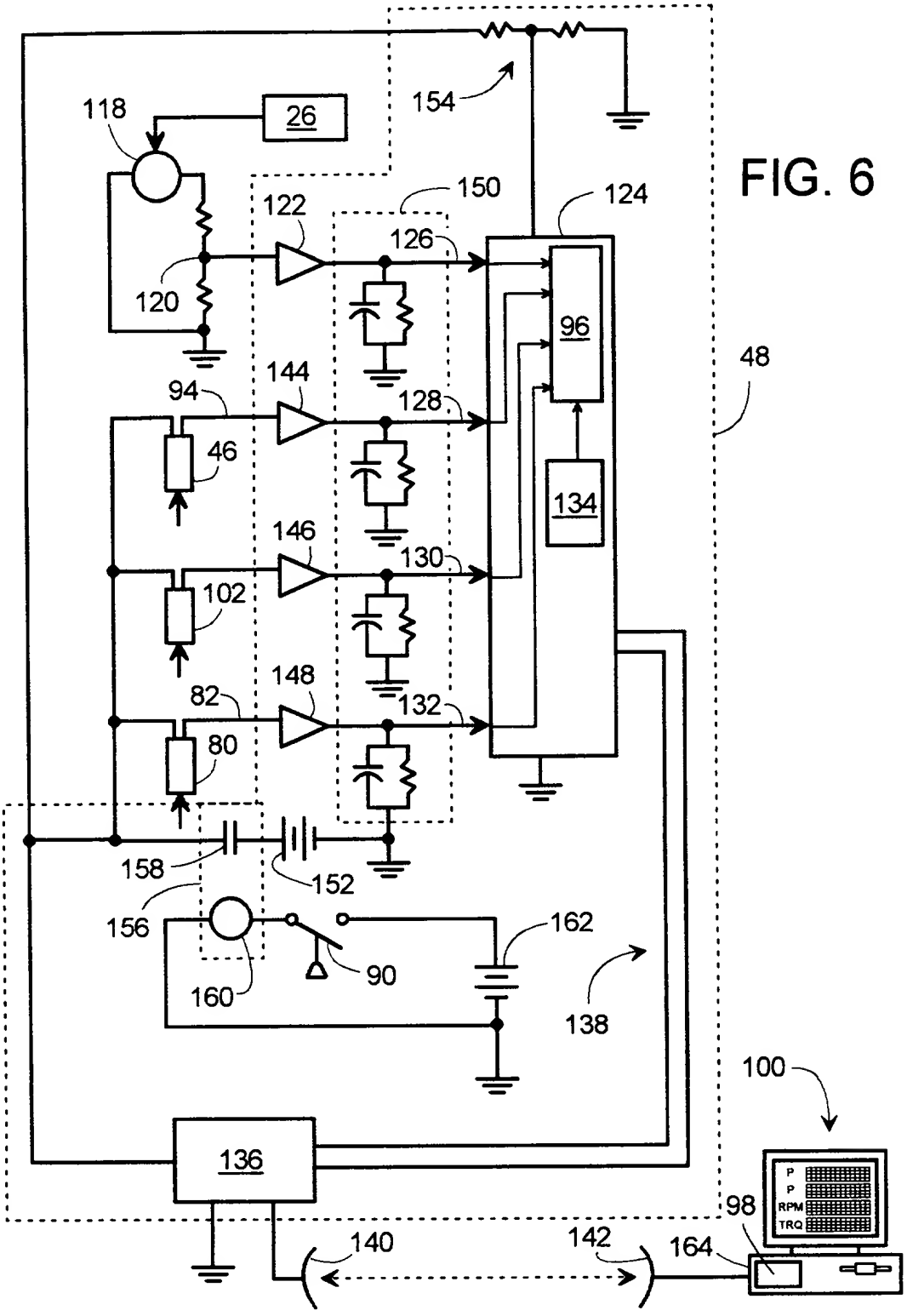

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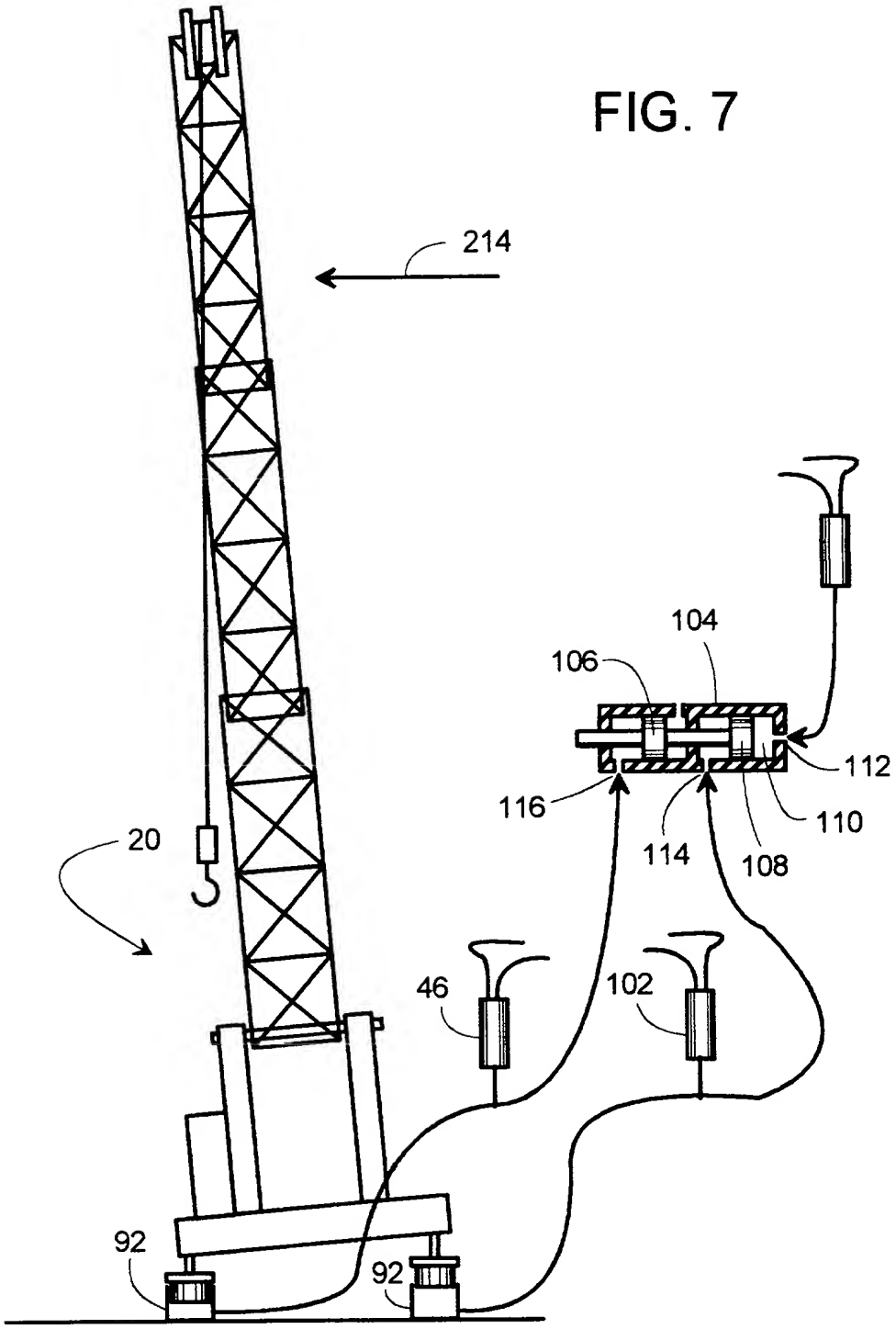
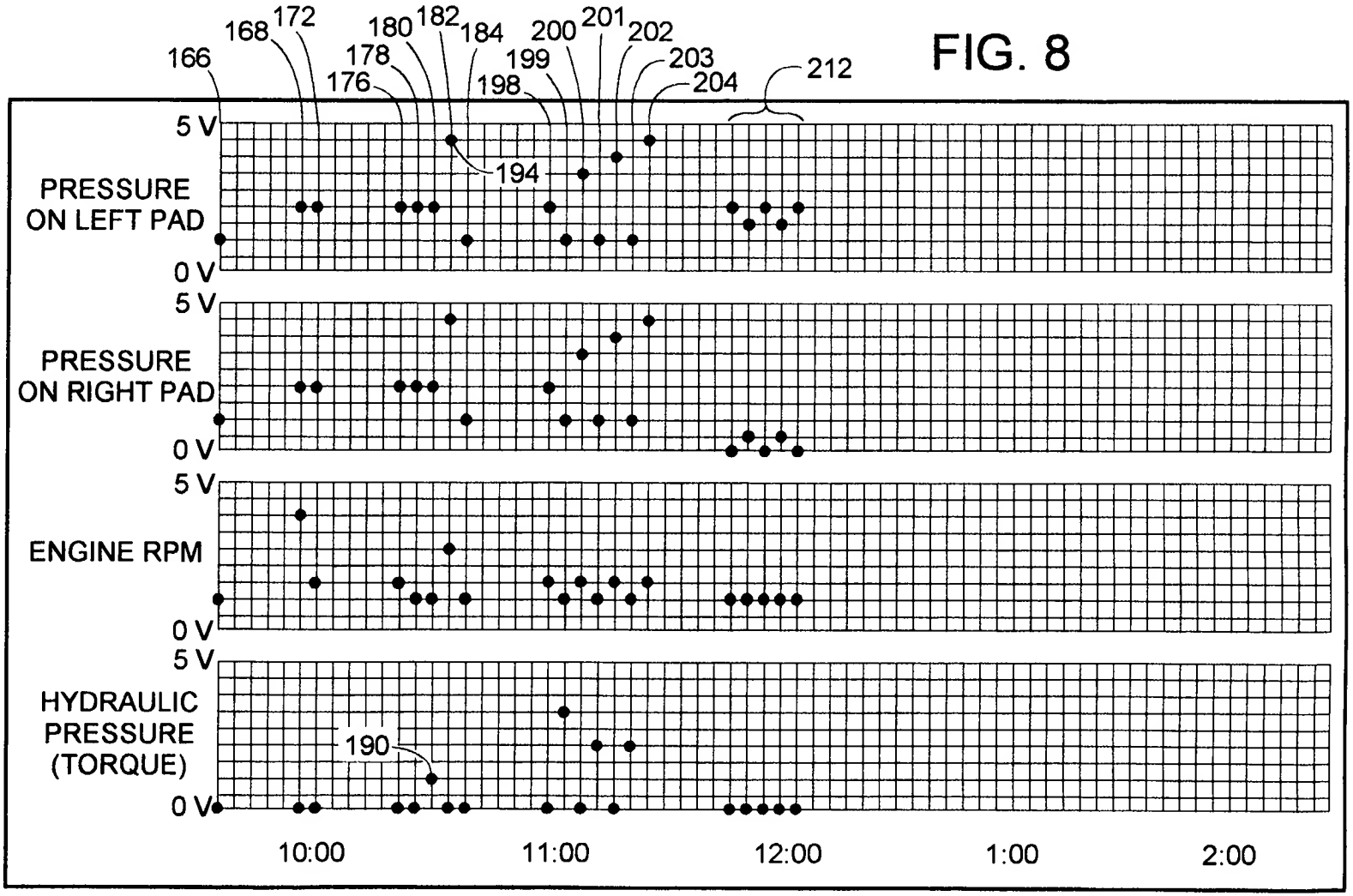
FIG. 6

FIG. 7

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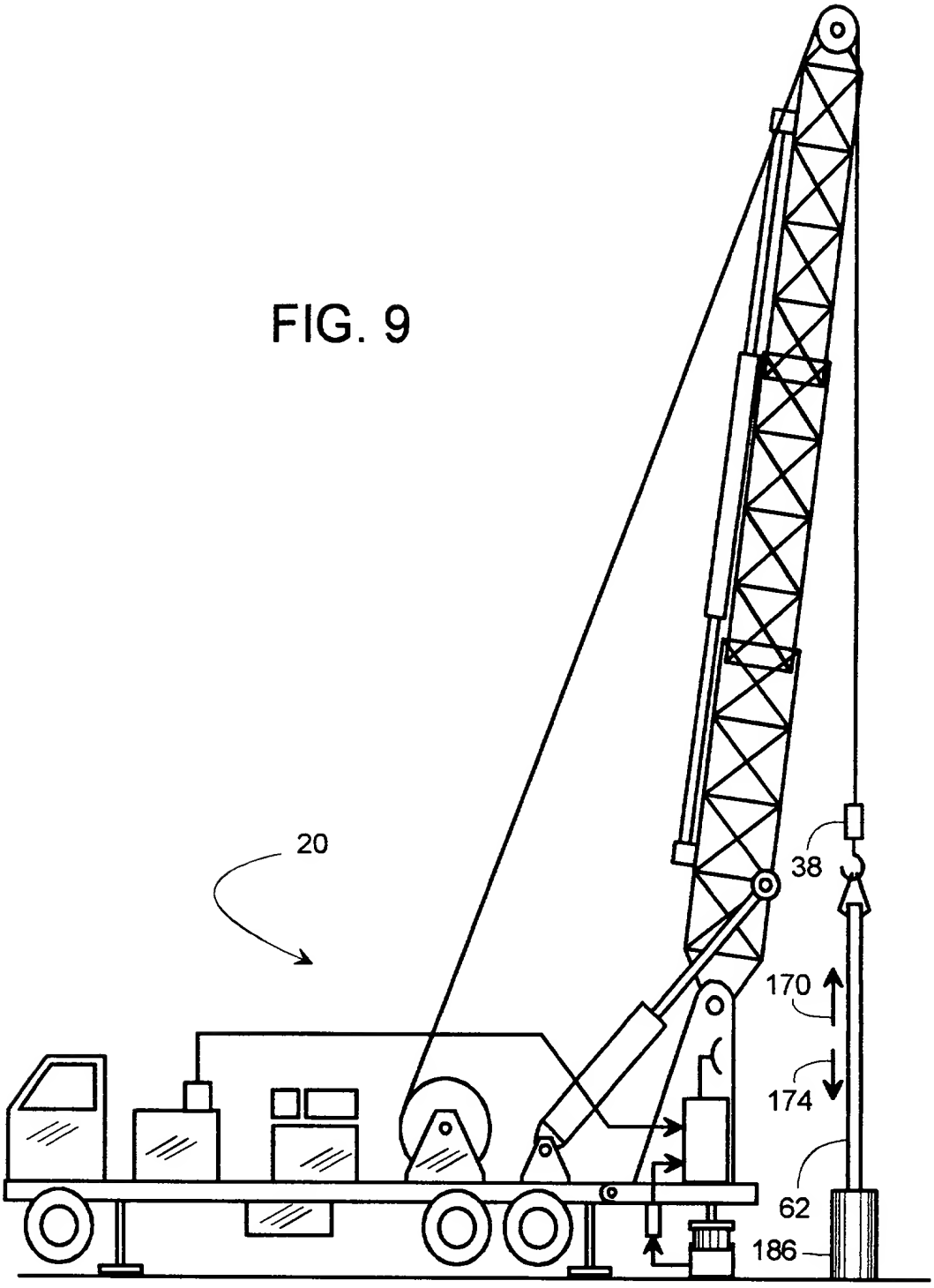
0 V
5 V
HYDRAULIC PRESSURE (TORQUE)
190
0 V
10:00
11:00
12:00
1:00
2:00

FIG. 8

FIG. 9



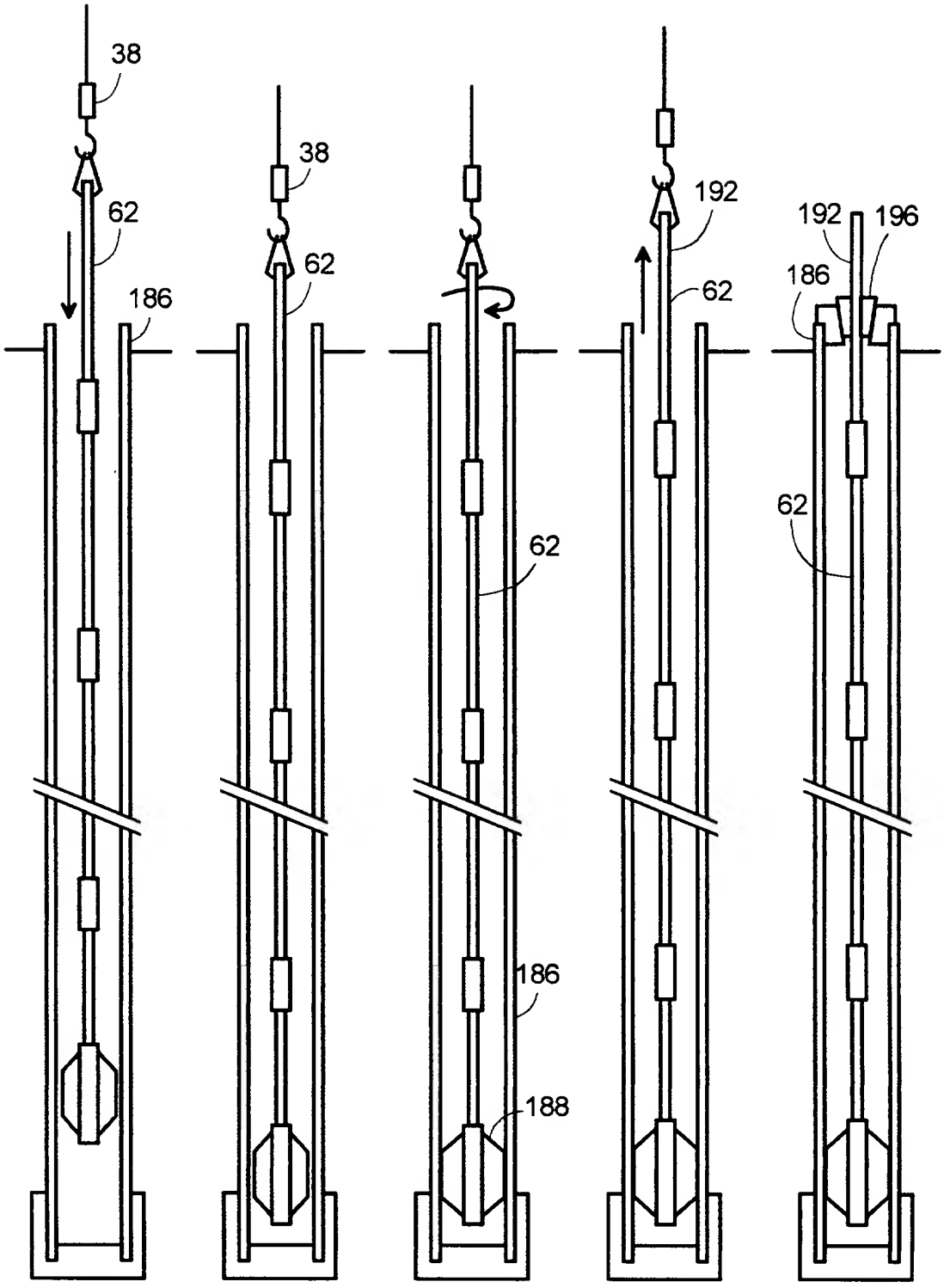


FIG 10 FIG 11 FIG 12 FIG 13 FIG 14

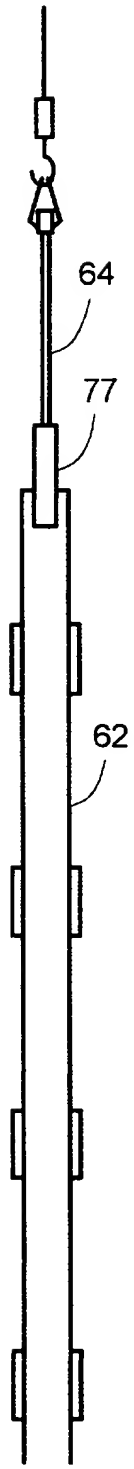


FIG 15

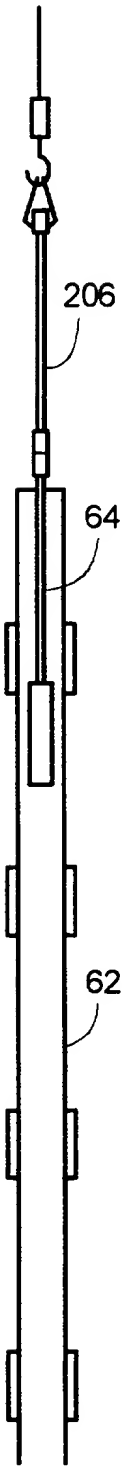


FIG 16

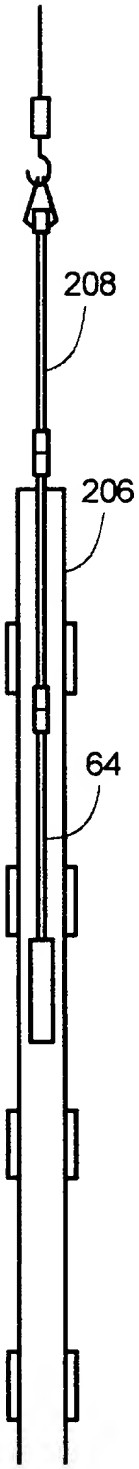


FIG 17

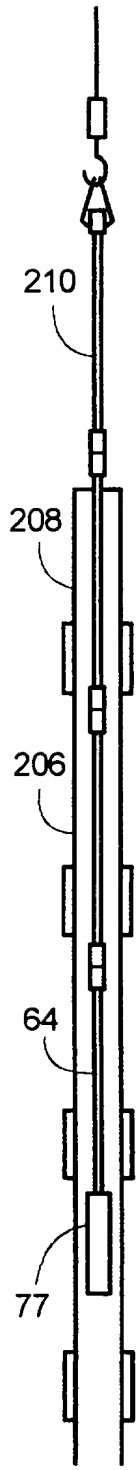


FIG 18

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:
My residence, post office address and citizenship are as stated below next to my name.
I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled, "REMOTELY ACCESSIBLE MOBILE REPAIR UNIT FOR WELLS," the specification of which is attached hereto unless the following box is checked:
☐ was filed on _____ as United States Application Number or PCT International Application Number _____ and was amended on _____ (if applicable).
I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.
I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations 1.56(a).
I hereby claim foreign priority benefits under Title 35, United States Code 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Claimed
(Number)	(Country)	(Day/Month/Year Filed	☐ Yes ☐ No
(Number)	(Country)	(Day/Month/Year Filed	☐ Yes ☐ No

I hereby claim the benefit under Title 35, United States Code 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code 113, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)
(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)

I hereby appoint the following attorney(s) and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:
Robert J. Harter, Reg. 32,031
Address all telephone calls to: Robert J. Harter at telephone number 608-788-2778
Address all correspondence to: Robert J. Harter
4233 Cliffside Drive
La Crosse, WI 54601
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor (given name, family name): Frederic M. Newman

Citizenship: U. S. Inventor's signature: * _____ Date: *March 28, 1997
Residence: 1618 West Dengar
Midland, TX 79705

Full name of second joint inventor, if any (given name, family name):

Citizenship: U. S. Inventor's signature: _____ Date: _____
Residence:

☐ Additional inventors are being named on a separate sheet attached hereto.

VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) & 1.27(b)) - INDEPENDENT INVENTOR

Docket No. (Optional)

Applicant or Patentee: Frederic M. Newman
Serial or Patent No: Unknown
Field or Issued: Concurrently

Title: REMOTELY ACCESSIBLE MOBILE REPAIR UNIT FOR WELLS

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

☒ the specification filed herewith with title as listed above.
☐ the application identified above
☐ the patent identified above

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or licensed any rights in the invention is listed below:

☒ No such person, concern or organization exists.
☐ Each person, concern or organization is listed below.

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Frederic M. Newman		
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
*		
Signature of inventor	Signature of inventor	Signature of inventor
* March 28, 1998		
Date	Date	Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN THE APPLICATION OF: FREDERIC M. NEWMAN
U.S. SERIAL NO: UNKNOWN
FILED: 4/13/98
FOR: REMOTELY ACCESSIBLE MOBILE REPAIR UNIT FOR WELLS

La Crosse, WI 54601
4/10/98

Certificate of Mailing by Express Mail Under 37 CFR 1.10

Commissioner of Patents & Trademarks
Washington D.C. 20231
Dear Sir:

I hereby certify that the attached Patent Application including the enclosed Declaration, Drawings, Filing Fee, and Small Entity Statement are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on 4/10/98 ~~4/13/98~~ (date) and is addressed to Commissioner of Patents & Trademarks, Washington D.C. 20231. The number of the Express Mail a mailing lable is EI538506231645.

~~4/13~~ 4/10/98 RJH

Respectfully submitted,

Robert J. Harter
Patent Agent for Applicants
Reg: 32,031